

Project Abstract

Applicant Name: Pat Barnes Chapter of Montana Trout Unlimited

Project Title: Flow study in the Lower Little Blackfoot River

Project Description and Benefits to Restoration:

This Small Project Grant would be used to measure the parameters of total river flow, total diversion, and total groundwater recharge on a reach specific basis along the Little Blackfoot River (LBR) from Avon to Garrison. This data would then be assimilated with similar flow data from an ongoing project in the LBR between Elliston and Avon to identify the location and duration of the reach specific target flows that would be necessary to meet suggested TMDL flow standards.

Proposed field work would include stream discharge measurements above and below eleven major irrigation diversions. A weekly schedule of monitoring would begin in June and end in October. The data would then be analyzed on a reach specific basis to determine how much water was going where, and how water necessary for meaningful in-stream flows could best be obtained to minimize impacts on agriculture. This study would also provide information on the effect of irrigation return on total groundwater recharge, a stated area of stakeholder concern.

A 1959 Powell County Water Resources Report named the LBR water shed as “only fair.” In 2002 Fish Wildlife and Parks listed the LBR from Elliston Creek to the confluence with the Clark Fork as a chronic stream-dewatering area of concern. Things have gone from fair to worse, and if history is any judge, the status quo is unlikely to change without the kind of impetus that reach specific flow data would provide.

The Pat Barnes Chapter of Trout Unlimited proposes to work closely with the Little Blackfoot Watershed Group, Montana Land and Water, and the Montana Water Trust, realizing that any realization of meaningful in-stream flows will build on the work these organizations have so capably begun.

Technical Narrative

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Project Title: Flow Study on the lower Little Blackfoot River

A. Describe Project/Define Problem

The Department of Environmental Quality (DEQ) has listed the LBR from Dog Creek to its mouth as “Non-supporting” for aquatic life and cold water fisheries (MDEQ, 2000). To address these concerns, Montana Fish Wildlife and Parks set an in-stream flow recommendation of 85 cfs for the LBR from Dog Creek to the mouth, and 17 cfs from the headwaters to Dog Creek (MWT, 2002). In another study, R2Cross sections performed by Land and Water Consulting show recommended in-stream flows of 49.9 at the USGS gaging station, and 8.3 cfs above the Snowshoe Creek Road (MWT, 2005). Average flow during the critical stream de-watering period from Aug. 5-Oct. 1, 2007 was 26.6 cfs with a minimum of 19 cfs (USGS 2007 online streamflow data). Based on this information, between 58.4 and 23.3 cfs needs to be added to the main stem LBR in a systematic and additive fashion in order to meet suggested TMDL water quantity standards.

Ongoing degraded conditions precipitate the need for this project. Maximum August water temperatures surpassed suggested trout survival temperatures (67°F) at 90% of monitoring sites along the main stem LBR (LWC, 2005). USGS data at the LBR monitoring site near Garrison show stream flows that routinely drop below twenty-five cfs from water year to water year. De-watering is persistent, and unlikely to change without the input of reach specific flow data that will quantify the problem and begin to answer the questions of LBR stakeholders about late-season groundwater recharge. PBTU proposes to do an intensive schedule of monitoring that will provide reach specific flow data on the LBR from Avon to Garrison. PBTU further proposes to synthesize this reach specific data with the reach specific data gathered concurrently in the MWT study above Avon, culminating with a quantified summation of the location and duration of de-watered reaches that would provide a meaningful starting point for the talks necessary to integrate a LBR basin-wide solution to in-stream flow.

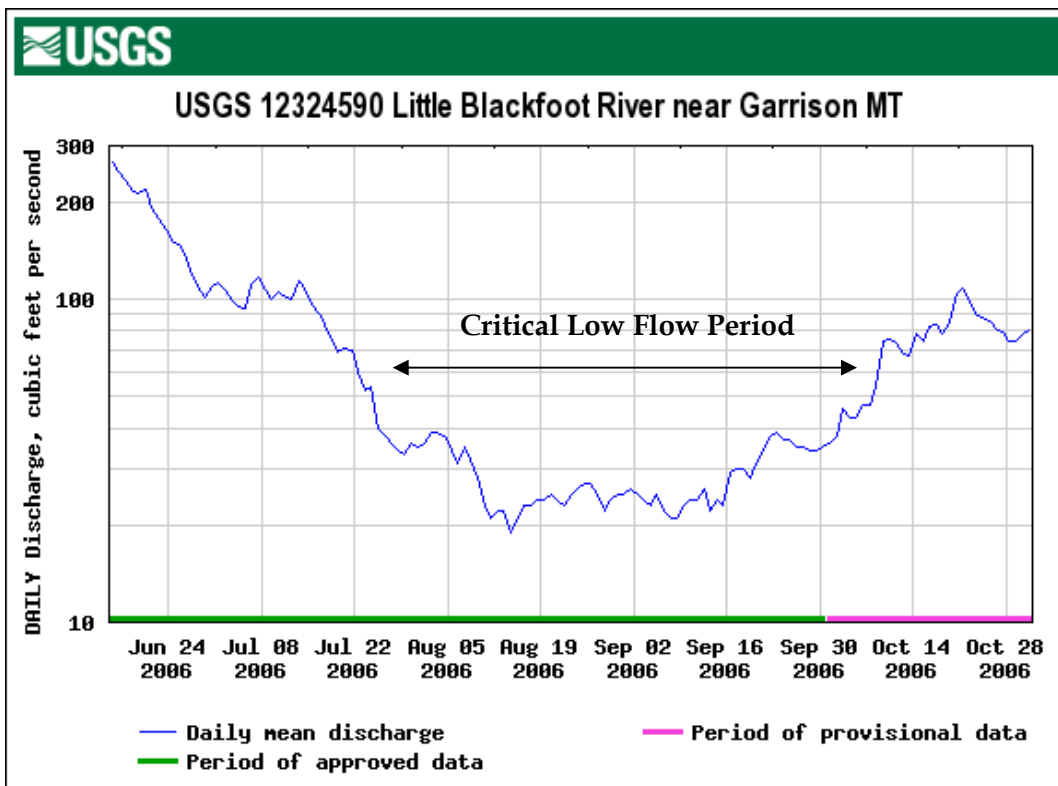
B. Describe the Project Goals and Objectives

Current Conditions

Low flows and high water temperatures on the LBR contribute to designations of “Non-supporting” of fisheries (FWP, 2002) to “Partially supporting,” (MWT, 2005). Cutthroat trout catch rates have declined from 1.7 to 0.8 fish per hour, overall catch rates have declined from 1.3 to 0.4 trout per hour fished (FWP, Catch Rate Data Logs). 67°F is the daily recommended maximum water temperature for trout: In 2003 13 out of 15 LBR water temperature sites exhibited temperatures exceeding 70°F, with one downstream site recording a high of 44 days of maximum temperatures exceeding 70°F (MWT, 2005). In 2006 at the USGS gaging station near Garrison 76 days (July 25-Oct. 7) had maximum flows of less than 50 cfs, and over 100 days had

maximum flows of less than 85 cfs, persisting into the end of October, and defining the period of critically low flow in the LBR depicted graphically in Fig. 1.

Figure 1 Critical Low Flow Period on the Little Blackfoot River



Examination of other water years show this period of low flow is persistent from year to year from the of end of July through the middle of October, and the high water temperatures associated with these low water flows are a limiting factor on the fishery, particularly native westslope cutthroat trout, a species of special concern which thrives in lower water temperatures than do brown trout.

Uncertainties in the current situation include reach specific flow data, particularly as it relates to late season de-watering. Stream flows in the LBR at the USGS gaging station near Garrison were conducted during haying in August 2001 (MWT, 2002). Observed flows on the dates of the study ranged from 86-45 cfs, while USGS data from the 2001 season shows thirteen days with an average daily flow below 25 cfs, and a daily low flow of 19 cfs. This synoptic study clearly did not quantify, nor was it designed to quantify, the period of critically low stream flow as described above. As a further example of the limits of synoptic studies, see Fig. 2, a photograph of a LBR irrigation diversion taken in mid-October, 2006.

Figure 2. Irrigation Diversion



The diversion was too wide to be adequately filmed with a 35mm lens, and consists of a wing dam constructed from three cottonwood trunks, bermed with river gravel, and extends from one river bank to the other. Instream flow is in black, the total amount of diverted water is shown by the white arrows. Observed flow in the irrigation diversion would suggest at least 95% of the river is being diverted and 5% left as stream flow. This is in direct contradiction with the data shown in Fig. 2-4, (MWT, 2005), which for the approximately the same stream reach mile 22.7, shows about 93% of the water as in-stream flow and 7% as diverted agricultural flow. Again, synoptic discharge studies carried out over only a few widely spaced days over the year are not designed to gather the reach specific data over time that is necessary to adequately define on a reach specific basis the period of critically low flow.

A map is attached as an addendum.

Underlying Causes of the Current Condition

Runoff from snowmelt is sufficient in most years to fully support both irrigation and in-stream flows until sometime in June or July. Water temperatures continue to rise and flows continue to drop until late July and early August, at which time in-stream flows stabilize as head gates are closed to dry out the fields for haying. Following haying, irrigation is resumed at ditch-full capacity resulting in critically low in-stream flows that persist into October, well past the main growing season.

Reach specific flow data on the LBR is extremely limited, yet considered to be of “critical importance in restoration planning,” (MWT, 2002). The best flow data comes from the USGS gaging station near Garrison and provides a useful benchmark of LBR flow data, but does not describe the highly variable flows occurring upstream. Other measurements include a total of seven flow measurements taken in 2006 at the Janke and Snowshoe bridges (ongoing MWT study). Synoptic flow studies (MWT, 2005, MWT, 2002) have been conducted on the LBR, but these studies are not designed to measure total river flow and groundwater recharge as a function of irrigation return on a reach specific basis. In short, chronic de-watering on the LBR has been described on a reach specific basis (MWT, 2002), but not quantified, and until reach specific flow studies have been conducted along the whole main stem LBR the amount of water available for potential water leases will remain in doubt.

The contributing factors of stream flow, irrigation diversion, and groundwater recharge will be measured on a reach specific basis directly within the study area.

Desired Future Condition

The primary Goals of this study include:

- 1) Quantification of total stream flow, total diversion, and total groundwater recharge at eleven major diversion sites.
- 2) Identify specific reaches in need of remedial in-stream flows based on the extent, timing and duration of the observed low flow regime.
- 3) Distribute this important new information as an educational project that will provide a meaningful jump-starting point for further negotiations between concerned parties regarding in-stream flow.

The Objectives to reach these goals include:

- 1) Monitoring stream flow at each of eleven sites weekly June 15-Oct. 15.
- 2) Data compilation, tabulation, and analysis.
- 3) This PBTU study complements the ongoing MWT study in many ways. The flow data collection is synergistic; worth more together than apart, the kind of basin-wide data that will be crucial to equitable long term solutions. This project synergy is also apparent when it comes to the distribution and compilation of final results. PBTU proposes to work with MWT in the distribution of a final report, and further proposes to present this new data in a town meeting of the LBWG and other concerned citizens.

Changes necessary to bring about desired future condition:

In 2006, the most recent water year, flows at the USGS station on the LBR near Garrison averaged 26.6 cfs from Aug. 5 to Oct. 1. In order to meet previously documented TMDL target flows of 49.9 to 78.6 cfs implies that between 23.3 to 52.0 cfs needs to be added incrementally to the river from Dog Creek to Garrison in order to meet minimum flow standards at the USGS gaging station; as a point of reference this stretch of river contains 30 major irrigation diversions (MWT, 2002).

Therefore, on average, based on current knowledge, it will take between 0.78 cfs and 1.73 cfs from each of these 30 diversions, maintained in the river in an additive fashion from Dog Creek to Garrison, to maintain the minimum recommended LBR flows necessary to support a healthy trout fishery. Water temperatures on the main stem LBR exceeded 70°F at eleven of thirteen monitoring sites for an average of 8.7 days at each site in 2003; a maximum of eighteen days exceeded 70°F at the Garrison USGS gaging station (LWC, 2005.) By contrast, a recent study at Montana State University shows that westslope cutthroat trout have an upper ultimate incipient lethal temperature of 67°F, and “water quality standards setting maximum daily temperatures from 55°F to 59°F, near the optimal growth temperature, would ensure suitable thermal habitat to maintain the persistence of westslope cutthroat trout populations,” (Bear, 2005.)

Project Benefits:

A primary benefit of this project includes the collection of baseline flow data necessary to break the stalemate between the beneficial uses of agriculture and fisheries that has existed on the LBR for nearly five decades. Reach-specific solutions to in-stream flow will be necessary, and reach-specific flow data will be essential to any discussions that lead to the implementation of viable in-stream flows. It is difficult to underestimate the importance of the collection of this baseline data; without it, the current state of de-watering will almost certainly persist.

Another direct benefit of this project is the potential to synthesize the reach-specific flow data in the LBR below Avon with the flow data accumulated in the concurrent MWT study in the LBR above Avon to develop comprehensive solutions to in-stream flow. The assimilation of this data would provide an educational base that would be invaluable in developing future projects that would provide basin-wide solutions in a cost-effective manner.

Secondary benefits would accrue as reach-specific data was used to implement future projects aimed at increasing in-stream flows. Secondary benefits to fisheries would include increased aquatic biomass, decreased water temperatures, and increased cover as wetted perimeter goals are met through increased flows. Secondary benefits to landowners would include all the future benefits of projects that were developed further, including stream rehabilitation, noxious weed control, riparian replacement and erosion abatement.

Project Plan in Chronological Order

Project implementation funding is sought for the summer of 2007 to allow PBTU to begin the study tasks in mid-June. In accordance with state procurement regulations PBTU proposes to contract for data collection with Dave Ames of Geoscience Services (GSS). Landowner permission is not necessary due to the Montana Stream Access Law and the nature of the LBR transportation corridor; landowners will be contacted regardless to foster a spirit of informed cooperation. This study will consist of five specific tasks overlapping through a six month period.

Task 1) Landowner contact and site development

Dave Ames, along with Jeff Janke of the LBWG, would meet with LBR landowners adjacent to monitoring sites of the upcoming project. The purpose of these discussions would be to educate landowners about project goals, objectives, and tasks; to address landowner concerns; and to lay the foundation of cooperation that will be necessary to implement long-term goals of re-watering specific reaches of the LBR. Interviews, site inspection and development, and coordination with MWT and LWC, estimated to require 40 hours, plus travel and office expenses.

Task 2) Stream flow gauging

GSS will identify and locate by GPS twenty two monitoring sites, one site above and one site below each of eleven major active irrigation diversions between Avon and Garrison. Flow measurements will be taken weekly for an eighteen week period (approximately June 15-Oct. 15) by hand held current meter using 6/10 depth method USGS protocol for open channel flow measurements (Buchanan and Somers, 1969). Flow will also be measured bi-weekly at the two major tributaries in this stretch of the LBR, Spotted Dog and Threemile Creeks. Digital photographs will be taken to visualize the range of flow regimes at each gaging station. The baseline collection of this flow data is a prime objective of this project, labor intensive, and a major expense; requiring a total of 396 mainstem LBR stream flow measurements and 18 tributary measurements for a total of 414 discharge measurements. The estimated technical time it will take to accomplish this task is 414 hours, not including travel.

Task 3) Data analysis and report preparation

GSS will tabulate and record flow data and digital photographs by downloading information into a computer on a daily basis following field work. Daily tabulation and record keeping is estimated to require 54 hours (36 days at 1 1/2 hours/day). The flow data will then be analyzed and assimilated into a final report estimated to require an additional 40 hours of professional time.

Task 4) Present Results

The report will be disseminated to all interested public and private groups in order to facilitate local, science-based solutions to water use issues in the LBR drainage. This would include but not be limited to landowners, the Little Blackfoot Watershed Group, the Montana Water Trust, Land and Water Consulting (PBS&J), the Clark Fork Coalition, Montana Department of Fish, Wildlife, and Parks, Montana Department of Environmental Quality, Montana Department of Natural Resources, Deerlodge Valley Conservation District, and the upper Clark Fork River Basin Steering Committee.

Conversations with Jeff Janke of the LBWG indicate local landowners won't meet to discuss in-stream flow solutions in the absence of new information. The data collected in this study and the concurrent MWT study provide the basis for such a meeting, and PBTU also proposes a town hall meeting at the Avon community center early in 2008 to bring landowners, PBTU, MWT, and LWC together to discuss the results of the data collection. In-stream flows have been increased in the Jefferson, Big Hole, and Big Blackfoot drainages by cooperative efforts; it would be possible to bring some of the people who were instrumental in those negotiations to answer landowner questions. This project would involve an additional 20 hours of professional time.

Project Time Schedule

The schedule on the project is tight but worth pursuing because of the benefits of gathering flow data along the whole main stem of the LBR in the same water year.

June 1-15: Contact Landowners, Establish monitoring sites

June 15-Oct. 31: Monitor sites on a weekly basis.

Nov.-Dec.: Data Analysis and Report Preparation

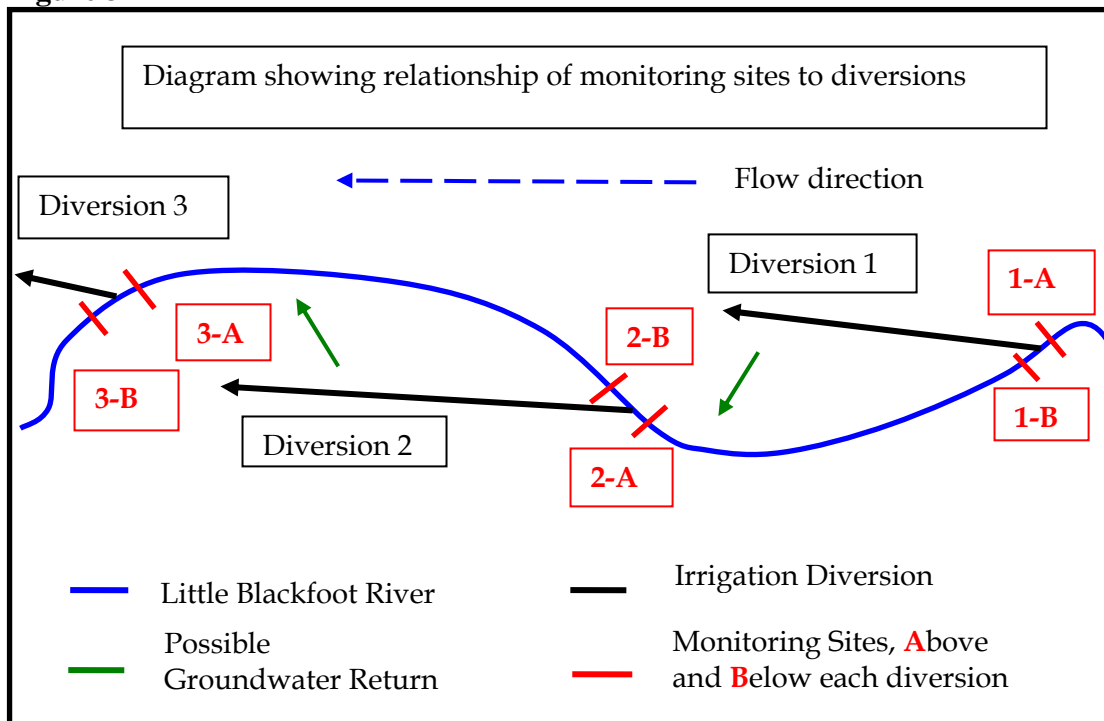
Dec.-Jan.: Present results in the forums most likely to yield results

Methods and Technical Feasibility

Field Monitoring and Data Analysis

Discharge measurements will be taken with a digital rod-suspended, hand-held Marsh-McBirney or equivalent current meter using the 6/10 depth method in accordance with standard USGS protocols. Discharge measurements at individual sites are likely to vary from over 100 cfs to less than 10 cfs, and monitoring sites must be selected with cross sections that will yield accurate results over this entire flow regime. Monitoring sites will be established in accordance with the diagram in Fig. 3, with a flow monitoring site above and below each of eleven major irrigation diversions.

Figure 3



For identification purposes the diversions would be numbered in order from Avon down. Monitoring Sites 1-A and 1-B would be the sites above and below the first diversion, 2-A and 2-B would be the sites above and below the second diversion, and so on. For each reach, measurements of total river flow, total irrigation diversion, and total groundwater recharge would be calculated in the following manner.

Total river flow, or discharge (Q), for each reach will be the value obtained at the monitoring site above each diversion. In the case of the first diversion, it would be the discharge measurement taken at site 1-A (Q_{1-A}). This measurement could be compared to the measurements taken at the other ten diversions (Q_{2-A} , Q_{3-A} and so on) to obtain reach specific values the location, duration, and timing of low flows in the LBR.

Total irrigation flow (I) at each diversion will be calculated by subtracting the discharge below the diversion (Q_{1-B}) from the discharge above the diversion (Q_{1-A}). For example, the total irrigation at the first diversion would be $(I_1) = (Q_{1-A}) - (Q_{1-B})$.

These measurements of total irrigation (I) could help equitably distribute the contributions of landowners to in-stream flow. For example, if the total measured diverted flow at one ditch was 40 cfs, and the total measured diverted flow at another ditch was 7 cfs, the amount of water each of these diversions would contribute to in-stream flow could be pro-rated based on relative diversion size (I). The amount of water supplied by each landowner to in-stream flow would then be a percentage of total use, a pro-rated distribution matrix that would not penalize smaller water users.

An approximation of total groundwater recharge (G) for each reach will be calculated by subtracting the total flow at the top of the reach from the total flow at the bottom of the reach. For example total groundwater recharge in Reach 1 (G_1) below the first diversion would be $(G_1) = (Q_{2-A}) - (Q_{1-B})$. Gaining reaches would have positive values, losing reaches would have negative values, and the values for (G) would indicate total groundwater recharge from natural sources and irrigation return less any streambed seepage and tributary inflow. The effect of tributaries should not be significant, because other than Threemile Creek and Spotted Dog Creek (where flows will be monitored and accounted for), tributaries on the LBR below Avon generally do not contribute measurable flows during the proposed monitoring period.

A complete groundwater breakdown is far beyond the financial constraints of this project. Nonetheless, trends in the groundwater situation may be revealed. For instance, it may be possible to study the effects of irrigation return on total groundwater recharge in a reach specific basis during haying. When ditches are precipitously closed, and total groundwater return values suddenly drop a week or two or three after the ditches go dry, that drop would most likely be due to the irrigation return lost to the closure of that ditch. Results would be as likely to show up in downstream reaches as in the reach where the ditch was closed. Results would be just as likely not to show up at all, which in itself would give an idea of the percent contribution to overall groundwater flow or the irrigation return from that particular ditch. Numbers will be imprecise, but since groundwater remains an area of landowner concern it makes sense to analyze the data for seasonal and reach-specific trends, and to that end, dated notes regarding ditch closures and cutting dates will be kept as a regular part of weekly monitoring.

Certainties, Uncertainties, and Data Gaps

There is a high degree of certainty that the field monitoring goals of this project can be met. The techniques for monitoring flow are well established and, with diligence and attention to detail, yield accurate data. The data will not measure the flow at every point on the LBR at every moment of the year. Data gaps will exist, but there is also a high degree of certainty that this study will generate statistically significant baseline data upon which educated decisions relating to in-stream flow can be based, and a foundation of information on which future studies can draw.

There is a reasonable degree of certainty that the flow data gathered in this study can be combined with the flow data gathered in the ongoing upstream MWT project in order to generate a basin-wide look at the landowner contributions to in-stream flow that would bring the LBR at Garrison up to TMDL standards. Flow data will not be collected as intensively in the upper study area, but conversations with MWT and LBWG indicate that flow can be studied in a manner that will contribute to desired results.

The greatest uncertainty in this project lies not in the gathering of the data, but in how that data will be received. There is historical precedent in Montana that a solution can be achieved. Cooperative efforts between recreational and agricultural users based on good science and sound flow measurements have been used to successfully elevate in-stream flows in the Big Hole, Blackfoot, and Jefferson rivers.

Bruce Rehwinkle, the TU Jefferson River Project Director, says the drought management plan conceived jointly between landowners and conservation advocates under the auspices of the Jefferson River Watershed Council is “the biggest success story they have,” and attributes the success to “lots of conversations.” John Kountz, a fourth generation Jefferson River rancher has become a “powerful voice for collaboration,” and says, “There’s only so much water. We just have to get along and figure out ways to make what water we have go further.” (Trout Magazine, fall, 2006.)

There is every reason to believe that a similar spirit of informed cooperation could work in the LBR, but there is no guarantee. If landowners are approached with specific requests for the water leases necessary to re-water the LBR, three things can happen. First, the water leases could be granted in full, and LBR flows would be maintained at TMDL levels. Fisheries would be sustained, many of the bureaucratic hurdles facing landowners would disappear. Second, the landowners could decide not to grant any water leases, and the problem of low flows in late summer and fall would continue unabated. The first option is as unlikely as the second. The third and most likely option is that some portion of the requested water would be made available to in-stream flow, and as long as the leased flow was maintained in the river in an additive fashion, water quality would begin to improve.

There is no certainty in which of these three options would be realized. There is certainty in that, no matter what, the scope of the task of re-watering the LBR to TMDL standards necessary to support a healthy fishery would be on the table. Negotiations could proceed. In what

will certainly be an ongoing process this project development grant won't be an end, but a beginning, a discernable foundation of hard numbers from which further talks can proceed.

Compromises could come in many forms. For example, the period of critical de-watering on the LBR coincides in large part with the end of the main growing season after the hay is in. Winter comes early to the LBR. There are only an average of 50 frost free days in Elliston, and 90 frost free days in Garrison (MWT, 2002.) A landowner who wasn't interested in leasing water in June might be more amenable in September, when there are days the irrigation water is turning to ice in the fields.

Another uncertainty in this proposal lies in the timing necessary to obtain funds in time to monitor flow beginning in June 2007. It would be desirable to initiate monitoring as close to the end of runoff as possible, which would give the best chance of beginning the study under a condition of saturated groundwater in adjacent hay fields, which would possibly yield data on the percent contribution of natural groundwater recharge as the rains stop as the season progresses. An additional advantage to this timing is that coordinating the summer's flow data with the ongoing MWT study would make it possible to come up with a comprehensive plan in time for the next water year. Momentum is paramount, a factor mentioned in all the MWT generated studies.

This project on the lower LBR fills a data gap in monitoring flow indicated as a priority in the MWT proposal for ongoing project in the upper LBR. Due to budgetary constraints this project is not designed to separate out the contributions of return irrigation and natural flow to total groundwater recharge. It is possible that data analysis will give some hint of these relationships, but it is also likely to remain somewhat of a data gap. At bank full discharge the main stem LBR is too high to wade and measure with a hand held current meter; the timing of June runoff may affect implementation of the proposed monitoring schedule.

Follow-up Monitoring Plan

Follow-up monitoring will be the provenance of future projects as they are developed, and not specifically tied to this project development grant. That said; it is almost impossible to underestimate the importance of follow-up monitoring. Science matters. Science can help address landowner concerns, and as an experimental watershed the LBR is of an almost perfect size to study various causes and effects.

The baseline data gathered as a result of this proposed study assesses total flow on the LBR, putting reach-by-reach numbers on the volume of the river, and thus its ability to sustain both in-stream flows and agricultural beneficial use. Follow-up monitoring would likely be necessary to ensure the downstream maintenance of beneficial flows. With follow-up monitoring, this data also has the potential to be used in another way to measure on a reach specific basis the effect of the lost irrigation water on groundwater recharge, an area of specific concern.

For example, consider the possibility that out of the eleven reaches studied in this project development grant, following negotiations, leases of one extra cfs of flow in six of those river

reaches were obtained. Follow-up monitoring on the same schedule as outlined in this proposal would generate groundwater return numbers reflecting the loss of that one cfs to potential return flows. Those numbers could then be compared to the baseline data gathered in this report, yielding before and after numbers that would indicate the effect on total groundwater recharge of the lost irrigation return.

PBTU would also work along with the stated goals of MWT with their program of hydrologic, biologic, and sociologic assessment as it relates to follow-up monitoring.

Project Team Qualifications

Dave Ames, Geoscience Services

Dave has a B.S. in Geology and worked as a hydrologist on the Helena National Forest designing experiments to measure the effects of logging, mining and road building on the quantity and quality of stream flow. He has written three fly-fishing books that have been released to critical and popular acclaim, experience that has given him an extensive working knowledge of trout and their habitat needs. He has ample experience measuring discharge on mountain streams, and in the labor-intensive monitoring schedule recommended in this report, his proximity to the river represents a cost benefit. Dave is on the Conservation Board of PBTU, he is also a LBR landowner.

John Wilson, Conservation Board, Pat Barnes Trout Unlimited

John has been active and effective in promoting fisheries for over thirty years , including sheperding the successful Legislative Development of In-stream flow water programs. He has a BA in Economics, State University of New York, and 55 graduate hours in the Environmental Studies Program at the University of Montana. He is currently the Associate Regional Director, National Parks Conservation Association; before that he was the Conservation Director for Montana Trout Unlimited, a Managing Director for the Montana Land Reliance, and the State of Montana Tourism Director. In 2006 he was part of the DEQ working group on Groundwater, and from 2002 - 2005 John was a member of the Governor's Water Pollution Advisory Council.

Jay Erickson , President, Pat Barnes Trout Unlimited

Jay's educational background includes a J.D. from the University of Montana, and an L.L.M. from the University of Denver. Jay clerked for the Chief Justice of the Montana Supreme Court, and worked as a litigator and estate attorney with the U.S. Treasury Department in Helena. He is well connected with Montana's real estate and tax professional groups, and currently works as a Managing Director for the Montana Land Reliance.

Tony Herbert, Conservation Chairman, Pat Barnes Trout Unlimited

Tony is the current chair of the Pat Barnes Missouri River Trout Unlimited Conservation Committee. As a long time fly-fishing enthusiast, Tony is a lifetime Trout Unlimited Member, and has actively participated with TU on a variety of restoration projects including re-vegetation on the Missouri River, the legal intricacies between groundwater and surface water as it relates to in-stream flows in the Smith River, and spawning habitat improvements in Little Prickly Pear Creek.

Brianna Randall, Development Associate, Montana Water Trust

It is essential that PBTU and MWT work closely together to ensure the flow data from the concurrent flow projects mesh beneficially, and Brianna develops Montana Water Trust's programs, from diversifying funding and public relations to conducting outreach and managing the intern program. Brianna holds a B.A. in Biology from the University of San Diego, and an M.S. in Environmental Studies from the University of Montana, where she wrote several research papers on water banks and trusts in the West. She is on the board of the Bitter Root Water Forum, a member of the Missoula Chamber of Commerce, and has taught writing at the U.M. College of Technology.

Supporting Technical Documentation

References:

“Little Blackfoot River Physical Features Inventory and Riparian Assessment,” Land and Water Consulting, Inc., May 2002.

“Little Blackfoot River Streamflow and Thermal Assessment Project,” Land and Water Consulting, Inc. May, 2005.

Discharge data logs, USGS gaging station on LBR near Garrison, MT, internet access

“Can’t keep a good river down,” Trout Magazine, Fall, 2006.

“Effects of temperature on survival and growth of westslope cutthroat trout and rainbow trout: Implications for conservation and restoration,” Bear, Master’s degree thesis, Montana State University, May, 2005.

“Discharge Measurements at Gaging Stations,” Techniques of Water-Resources Investigations of the United States Geologic Survey, Buchanan and Somers, 1969

Maps and photos have been submitted as a part of this report.

Informal bids were solicited from LWC, GSS, and Geomatrix. The Geomatrix bid was \$85.00/hour plus travel. LWC informal monitoring costs were \$60.00/hour plus travel for technical time, and \$80.00/hour plus travel for professional time. GSS billed all time at \$60.00/hour, donated \$10/hour as an in-kind contribution for PBTU, for a net cost of \$50.00/hour including travel. Based on these figures an estimated budget is:

Budget Breakdown After In-Kind Contribution		
Task/Expense	Comments	Total Expense
Site Prep/Project Prep/ Landowner Contacts	40 hours @ \$50.00/hour	\$2000.00
Streamflow monitoring	414 hours @ \$50.00/hour	\$20,700.00
Data Tabulation/ Photo Tabulation	54 hours @ \$50.00/hour	\$2,700.00
Final Report Writing	40 hours @ \$50.00/hour	\$2,000.00
Report Distribution/ Town Hall Meeting	20 hours @ \$50.00/hour	\$1000.00
Office expenses	Miscellaneous Supplies	\$100.00
Total	Total PBTU In-kind: 568 hours @ \$10.00/hour	\$28,500.00

Criteria Statements

1. Relationship of Expected Costs to Expected Benefits:

The Little Blackfoot River, a major tributary to the Upper Clark Fork River, is an injured natural resource that will receive direct benefits from the proposed study. This project will lay the groundwork for restoring water in critically dewatered reaches of the LBR through voluntary agreements with landowners.

Water quantity is an impairment factor listed in the 2002 Land and Water assessment, and is recognized as a limiting factor for habitat health by state and federal natural resource management agencies and local conservation groups. This study will determine where and when the LBR and its associated fishery is degraded due to low and extremely low flows. Increasing streamflow improves overall water quality, creating colder temperatures and enhancing critical fish spawning and rearing habitat. Improving flows and habitat also has direct benefits for lost services such as recreation.

Indirect benefits include maintaining momentum for proactive restoration solutions in this watershed. Coordinating flow data in the summer of 2007 with the ongoing upstream project will make it possible that the beginnings of a systematic set of water leases designed to maintain meaningful in-stream flows could be in place by as early as 2008. This project will be useful for all stakeholders in the basin, especially as we disseminate information on landowner willingness to participate in restoration efforts. This study will also have indirect benefits outside the basin, acting as a model for how to determine irrigation return flows when considering water use solutions.

Direct costs will be NRD project development grant funding and PBTU matching funds. Indirect costs may result from public state and federal agencies providing technical advice, or contributing time and resources to help coordinate restoration efforts during or after the study.

2. Cost Effectiveness:

PBTU determined that the above study design was the most cost effective and efficient in providing the specific flow data that is most likely to lead to water leasing. One alternative considered was conducting a groundwater-surface water study as is occurring in the ongoing study in the upper LBR. Since the cost of the study would increase beyond viable levels, and there was no guarantee landowners would give permission for the wells and piezometers the study would entail, especially in light of the projected 2007 time frame, this option was rejected as unnecessary to achieve stated project goals.

Another alternative considered was the installation of more permanent monitoring devices, such as aqua rods or stilling wells, as opposed to the measurement of flow by hand held current meter. While permanent flow devices might be a viable option for long term monitoring on the LBR, the cost to buy, install, and maintain expensive capital equipment is simply not there in this budget. USGS data logs on the LBR near Garrison show instantaneous fluctuations in discharge of up to 40 cfs as gates are opened and closed, an additional benefit of hand-held monitoring is flexibility in monitoring what will be a highly variable flow regime.

In order for the flow sampling in this project to be meaningful it must happen with sufficient frequency to accurately capture these changing flows, especially if nuances of groundwater flow are to be quantified. Sampling rates of once a month are clearly insufficient, sampling rates of once a day would be budget-busting and scientific overkill. A weekly sampling rate was selected because it was the highest rate that would fit the budget, and since most

diversions even during haying stay open or closed for more than a week at a time, a weekly sampling is highly likely to produce an accurate assessment of the relationship of total river flow to total diversion and total groundwater recharge.

Alternatives were also considered for the duration of the sampling schedule. It is unlikely this project could begin any earlier than the dates given in this proposal given the dual constraints of the grant process and runoff. It was considered a priority of this project to intensively monitor the low flow period that begins in August and extends well into October. In order to capture that data, October 31 was selected as an end date because at this point in most years instream flows are sufficient to meet TMDL standards, stable, and tending toward winter flow regimes.

A “no action” alternative was considered not only non-viable, but detrimental by MWT. The organization has received many requests for hydrologic data when meeting with landowners regarding water leasing, specifically on the impacts of irrigation return flows on the LBR. Gathering objective streamflow data will prove invaluable in equitably distributing to irrigators the shared cost of in-stream flow. This study will be a valuable addition to the ongoing talks on collaborative restoration efforts in the basin, and a quantitative baseline perspective on water use in the LBR.

The study design chosen will continue to educate landowners on innovative, cooperative restoration approaches, demonstrate the impacts and benefits of the current pilot water lease, and maintain public momentum in LBR restoration efforts. The main costs of the study are travel, staff time, and data collection.

3. Impacts to the Environment and Human Health and Safety:

No negative impacts to the environment or human health and safety will result from the implementation of the proposed project. Positive impacts include: improved water quantity and water quality, enhanced recreational opportunities and aquatic and riparian resources, and increased knowledge of the hydrology and current water use trends in the LBR basin.

4. Public Support:

Letters of public support will be solicited from the following people and organizations, in most cases verbal support for this project has already been obtained.

Brianna Randall, Montana Water Trust
Matt Clifford, Clark Fork Coalition
Jeff Janke, Little Blackfoot Watershed Group
Stan Bradshaw, Upper Clark Fork River Basin Steering Committee

5. Public Access:

The project area is mainly within the high water mark of the Little Blackfoot River and four tributaries, which are state/public waters. Anglers and recreationalists have access to the river up to its normal high water mark under the Montana Stream Access Law. This study will not affect public access points; however, improving stream flows and enhancing the fishery might increase the amount of requests to private landowners for property access by fishers in the future.

PROPOSAL BUDGET

PROJECT BUDGET SUMMARY FORM									
EXPENSE CATEGORY		UCFRB RESTORATION FUND	APPLICANT CONTRIBUTION			OUTSIDE SOURCES			TOTAL
			Cash	In-Kind	Sub-Total	Cash	In-Kind	Subtotal	
1	SALARIES, WAGES, ADMINISTRATION								
2	FRINGE BENEFITS								
3	CONTRACTED SERVICES	\$25,000.00	\$3,500.00	5,680.00					\$34,180.00
4	SUPPLIES AND MATERIALS								
5	COMMUNICATIONS								
6	TRAVEL								
7	CONTRACTED SERVICES								
8	EQUIPMENT								
9	MISCELLANEOUS								
TOTAL		\$25,000.00	\$3,500.00	\$5680.00					\$34,180.00

Budget Narrative:

Applicant: Pat Barnes Trout Unlimited

Project Title: A Flow Study on the lower Little Blackfoot River

The bulk of the budget necessary to meet stated goals will go toward the actual accumulation of data through stream flow monitoring. Two measurements at each of eleven diversion sites will be made weekly, for a total of 22 measurements per week for 18 weeks, plus 18 total measurements at Spotted Dog and Threemile Creeks, making a total of 414 stream flow measurements. Assuming one hour per measurement, which is probably on the low side if you figure in set-up time and time required to travel between sites, this project is estimated to take 414 hours of monitoring time, plus 54 hours of data tabulation time, resulting in a total of 468 hours of technical time. The budget also includes 100 hours of professional time for project implementation and design, the compilation of a final report, coordination with MWT, and distribution of the data.

The GSS bid for technical work (including PBTU in-kind contributions of \$10.00/hour) is \$23,400, a savings of \$4,680.00 plus travel over the next lowest bid. The savings for 100 hours of professional time is \$30.00/hour, or \$3,000.00, resulting in a total savings of \$7,680.00 plus travel over the next lowest bid. In a labor intensive study like the monitoring this study proposes, travel, even from Helena, would be extensive. PBTU believes it makes good economic sense to contract with a firm local to the LBR, thus minimizing travel time, travel cost, and maximizing savings.

GSS budgeted 40 hours of lead time to monitoring site selection, landowner contact, and coordination with LWC and MWT. Monitoring is expected to take 3 days per week over 18 weeks, and additional hour per day was included for data and digital photo computer storage and tabulation for a total of 54 hours. 40 hours of time was budgeted for data compilation, analysis, the development of a final report tabulating the flow results of this study, and an additional 20 hours was included for the distribution of the final report and the coordination of a town hall meeting. This project is expected to take a total of 568 hours.